

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-163405

(43)Date of publication of application : 29.06.1993

(51)Int.Cl.

C08L 27/06

C08K 5/09

C08K 5/36

(21)Application number : 03-331973

(71)Applicant : DAICEL CHEM IND LTD

(22)Date of filing : 16.12.1991

(72)Inventor : MIYAKE YUJI

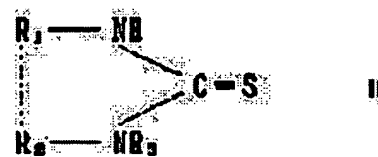
TAKAHASHI SAKAE

(54) NEAR-INFRARED ABSORBING VINYL CHLORIDE-BASED RESIN COMPOSITION AND ITS MOLDING

(57)Abstract:

PURPOSE: To provide the subject vinyl chloride-based resin composition excellent in permeability of visible light and near-infrared absorption and its sheet or its sheet-shaped material.

CONSTITUTION: With (A) 100 pts.wt. vinyl chloride-based resin, (B) 0.05 to 5 pts.wt., preferably 0.05 to 2.5 pts.wt. of one or more kinds of copper compounds selected from a copper compound (e.g. copper stearate) represented by formula I (R is H, an alkyl, a cycloalkyl, etc.; X is -COO, -SO₄, etc.; n is 1 to 4), copper chlorophyll, sodium copper chlorophyll and bisacetylacetonatocopper and (C) 0.05 to 50 pts.wt., preferably 0.05 to 10 pts.wt. of one or more kinds of compounds selected from a thiourea derivative (e.g. 1-ethyl-3-phenylthiourea) represented by formula II (R₁ to R₃ are H, an alkyl, a cycloalkyl, etc.), a thioamide derivative (e.g. N-methylthiobenzamide) represented by formula III (R₄ and R₅ are H, an alkyl, etc.) and other compounds are blended.



LEGAL STATUS

[Date of request for examination]

29.09.1998

[Date of sending the examiner's decision of rejection] 26.09.2000

[Kind of final disposal of application other than the
examiner's decision of rejection or application
converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of
rejection] 2000-17022

[Date of requesting appeal against examiner's
decision of rejection] 26.10.2000

[Date of extinction of right]

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CLAIMS

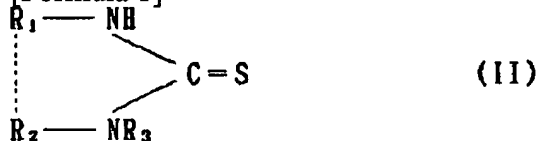
[Claim(s)]

[Claim 1] (A) Vinyl chloride system resin 100 It is (B) to the weight section. General formula (I)

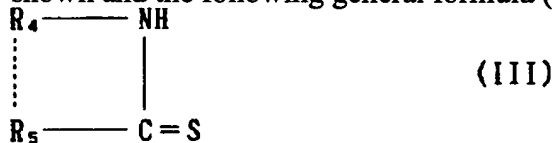
(R-X)_nCu (I)

R among [type Hydrogen, an alkyl group, a cycloalkyl radical, an aryl group, Monad and X which are chosen from the group which consists of an aralkyl radical and heterocycle residue (each radical may have one or more substituents) - COO, -SO₄, -SO₃, -PO₄, and -O, n At least a kind of copper compound 0.05 chosen from the group which consists of the copper compound expressed with integer] of 1-4, chlorophyll copper, sodium copper-chlorophyllin, and bisacetylacetonate copper - 5 weight sections, and (C) The following general formula (II)

[Formula 1]



(R₁, R₂, and R₃ may express the monad chosen from the group which consists of the heterocycle residue of hydrogen, an alkyl group, a cycloalkyl radical, an aryl group, an aralkyl radical and 5 members, or 6 members, each radical may have one or more substituents, R₁, R₂, or R₂ and R₃ may connect, and they may form a ring) the thiourea derivative shown and the following general formula (III) -- [Formula 2]



R₄ and R₅ -- hydrogen, an alkyl group, an alkenyl radical, and a cycloalkyl radical -- The monad chosen from the group which consists of the heterocycle residue of an aryl group, an aralkyl radical and 5 members, or 6 members is expressed. R₅ may also express an alkoxy group further and each radical may have one or more substituents. R₄ and R₅ may connect and they may form a ring. Near infrared ray absorption vinyl chloride system resin constituent characterized by the thing which is chosen from the thioamide derivative shown, and which contain at least one sort of 0.05 - 50 weight sections, and changes.

[Claim 2] The near infrared ray absorption vinyl chloride system resin Plastic solid which a vinyl chloride system resin constituent according to claim 1 is fabricated a sheet or in the shape of a film, and changes.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention penetrates a visible ray comparatively well, and relates to the near infrared ray absorption vinyl chloride system resin Plastic solid which is fabricated the new vinyl chloride system resin constituent excellent in near infrared ray absorbing power and a sheet, or in the shape of a film, and changes. Researches and developments are the functional material currently performed briskly, and especially the charge of a near infrared ray absorber can be used recently as optical materials, such as information record ingredients, such as sensitive material which makes the light source semiconductor laser light which has the wavelength of a near infrared region, and a record ingredient for optical disks, an infrared cut filter, and a film, and a heat ray absorptivity grading ingredient.

[0002]

[Description of the Prior Art] It is tungsten hexachloride as conventionally shown in U.S. Pat. No. 3692688 as a light transmission nature ingredient of near infrared ray absorptivity. (WCl₆) Tin chloride (SnCl₂·2H₂O) The ingredient excellent in the near infrared ray absorbing power which dissolves in methyl-methacrylate syrup (monomer) and is acquired by carrying out a polymerization and which does not have Hayes substantially is known. Furthermore, as a charge of a near infrared ray absorber developed in addition to this until now, chromium, cobalt complex salt, and the new squarylium compound that there has an anthraquinone derivative in a thiol nickel complex and JP,61-115958,A, and has absorption maximum wavelength in JP,60-21294,B at JP,61-218551,A at a 700-800nm field are indicated by JP,60-42269,B.

[0003]

[Problem(s) to be Solved by the Invention] although the conventional charge of a near infrared ray absorber had the trouble that as for the thing of an organic system endurance be bad and early capacity deteriorated in connection with change and the passage of time of an environmental condition and the thing of a complex system be durable on the other hand , not only the near-infrared section but the visible region had absorption , and there be a problem that there be much what the compound itself be color strongly , and an application will be restrict . Furthermore, on the wavelength as which the absorption peak was regarded in specific wavelength and both of the things of a system shifted [wavelength] from the peak, it was what absorbing power does not almost have. If the record object which makes the light source laser light which has the wavelength of the near-infrared section is considered using these materials, it is necessary to double the wavelength of a laser line, and the wavelength in the absorption peak of an ingredient. However, the combination with which also in the wavelength of a laser line the wavelength of a laser line and the wavelength in the absorption peak of the charge of a near infrared ray absorber agree since only that to which the absorption wavelength of the charge of a near-infrared absorber was also restricted is obtained could not but become a ***** thing.

[0004] Moreover, WCl₆ of the above-mentioned conventional technique The constituent which dissolved SnCl₂·2H₂O in methyl-methacrylate syrup colored in dark blue, and although it had the property which absorbs a near infrared ray well, it had the trouble of carrying out tenebrescence between prolonged neglect in a dark place. Thus, the photochromism which advances gently was a trouble which is not desirable when offering the industrial products equipped with fixed quality, such as a light filter and heat ray absorptivity grading.

[0005]

[Means for Solving the Problem] It comes to complete a header and this invention for the outstanding charge of a near

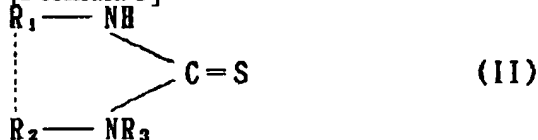
infrared ray absorber made into the purpose being obtained by seeing absorption uniformly in this invention and the 800-2000nm whole near infrared region, and making a copper compound, a thiourea system derivative, or (reaching) a thioamide system derivative contain in vinyl chloride system resin, as a result of coloring repeating examination wholeheartedly about the charge of a near infrared ray absorber in which endurance was excellent few.

[0006] That is, this invention is (A). Vinyl chloride system resin 100 It is (B) to the weight section. General formula (I) $(R-X)_nCu$ (I)

R among [type Hydrogen, an alkyl group, a cycloalkyl radical, an aryl group, Monad and X which are chosen from the group which consists of an aralkyl radical and heterocycle residue (each radical may have one or more substituents) - COO, -SO₄, -SO₃, -PO₄, and -O, n At least a kind of copper compound 0.05 chosen from the group which consists of the copper compound expressed with integer] of 1-4, chlorophyll copper, sodium copper-chlorophyllin, and bisacetylacetonate copper - 5 weight sections, and (C) The following general formula (II)

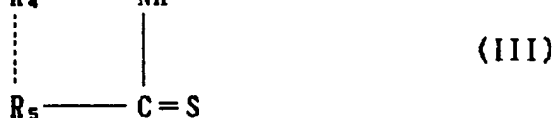
[0007]

[Formula 3]



[0008] (R₁, R₂, and R₃ may express the monad chosen from the group which consists of the heterocycle residue of hydrogen, an alkyl group, a cycloalkyl radical, an aryl group, an aralkyl radical and 5 members, or 6 members, each radical may have one or more substituents, R₁, R₂, or R₂ and R₃ may connect, and they may form a ring) The thiourea derivative shown and the following general formula (III) [0009]

[Formula 4]



[0010] R₄ and R₅ -- hydrogen, an alkyl group, an alkenyl radical, and a cycloalkyl radical -- The monad chosen from the group which consists of the heterocycle residue of an aryl group, an aralkyl radical and 5 members, or 6 members is expressed. R₅ may also express an alkoxy group further and each radical may have one or more substituents. R₄ and R₅ may connect and they may form a ring. It is related with the near infrared ray absorption vinyl chloride system resin constituent characterized by the thing which is chosen from the thioamide derivative shown, and which contain at least one sort of 0.05 - 50 weight sections, and changes. Moreover, this invention relates to the near infrared ray absorption vinyl chloride system resin Plastic solid which is fabricated a sheet or in the shape of a film, and changes the vinyl chloride system resin constituent which consists of the aforementioned presentation.

[0011] Although gay vinyl chloride resin excellent in thermal stability, tensile strength, and thermal resistance is desirable as vinyl chloride system resin used in manufacture of the resin ingredient of this invention, little **** blend polymer does not interfere further the vinyl chloride system copolymer which makes a subject the vinyl chloride to which copolymerization of a small amount of comonomer was carried out, a graft copolymer, vinyl chloride system resin and resin with sufficient compatibility, for example, a vinylidene chloride, an ethylene-vinylacetate copolymer, chlorinated polyethylene, etc., either. Furthermore, such mixture is also useful.

[0012] Moreover, although the following can be illustrated as a copper compound shown by the above-mentioned general formula (I) used by this invention, it is not limited to these.

[0013] Stearin acid copper, PANAMICHIN ****, copper oleate, behenic acid copper, lauryl ****, Capric-acid copper, caproic-acid copper, valeric-acid copper, isobutyric-acid copper, butanoic acid copper, propionic-acid copper, Copper acetate, formic-acid copper, copper hydroxide, benzoic-acid copper, alt.toluic-acid copper, meta-toluic-acid copper, Para toluic-acid copper, PARATASHA rib chill benzoic-acid copper, alt.KURORU benzoic-acid copper, Dichloro benzoic-acid copper, Tori Krol benzoic-acid copper, p-bromine benzoic-acid copper, p-iodine benzoic-acid copper, o-benzoylbenzoic acid copper, p-nitrobenzoic acid copper, Anthranilic-acid copper, p-aminobenzoic acid copper, oxalic acid copper, malonic-acid copper, Succinic-acid copper, glutaric-acid copper, adipic-acid copper, pimelic-acid copper,

suberic-acid copper, Azelaic-acid copper, sebacic-acid copper, phthalic-acid copper, monoester phthalic-acid copper, Copper naphthenate, naphthalene carboxylic-acid copper, tartaric-acid copper, diphenylamine-2-carboxylic-acid copper, 4-cyclohexyl butanoic acid copper, diethyldithiocarbamic acid copper, cupric gluconate, Diethoxy copper, G i-propoxy copper, octylic acid copper, alkylbenzene-sulfonic-acid copper, P-toluenesulfonic-acid copper, naphthalenesulfonic acid copper, naphthylaminesulfonic acid copper, n-dodecylbenzenesulfonic acid copper, a dodecyl copper sulfate, 2, 5-dimethylbenzene sulfonic-acid copper, 2-KARUBO methoxy-5-methylbenzene sulfonic-acid copper, alpha-naphthyl phosphoric-acid copper, G 2-ethylhexyl phosphoric-acid copper, isodecyl phosphoric-acid copper.

[0014] Although the following can be illustrated as a thiourea derivative shown by the general formula (II) used by this invention, it is not limited to these.

1-ethyl-3-phenyl thiourea, 1, 3-diphenyl thiourea, 1, 3-diethyl thiourea, 1-ethyl-3-p-chlorophenyl thiourea, 1-ethyl-3-(2-hydroxyethyl) thiourea, 1-(2-thiazolyl)-3-phenyl thiourea, 1, 3-distearyl thiourea, 1, 3-dibehenyl thiourea, 1-ethyl thiourea, 1-p-BUROMO phenyl-3-phenyl thiourea, 1-(2-thiophenyl)-3-phenyl thiourea, 1, 3-screw (2-hydroxyethyl) thiourea, 1-p-aminophenyl-3-phenyl thiourea, 1-p-nitrophenyl-3-phenyl thiourea, 1-p-hydroxyphenyl-3-phenyl thiourea, 1, 3-G m-KURORU phenyl thiourea, Ethylene thiourea, thiourea, 1-methyl-3-p-hydroxyphenyl thiourea, 1-phenyl thiourea, 1-m-nitrophenyl thiourea, 1-p-nitrophenyl thiourea, 1-p-aminophenyl thiourea, 1, 3-dimethyl thiourea, 1, 3-dicyclohexyl thiourea, 1-phenyl-3-p-chlorophenyl thiourea, 1-phenyl-3-p-methoxyphenyl thiourea, 1, and 1-diphenyl thiourea, 1, and 1-dibenzyl-3-phenethyl thiourea, 1-phenyl-3-(2-hydroxyethyl) thiourea.

[0015] Although the following can be illustrated as a thioamide derivative shown by the general formula (III) used by this invention, it is not limited to these.

N-methylthio Benz amide, N-phenylthio Benz amide, and N-ethyl thio ethyl amide, A N-ethyl thio-p-KURORU Benz amide and N-propyl thio Benz amide, A N-ethyl thio stearyl amide and an N-1-(2-thiazolyl) thio Benz amide, A N-stearyl thio stearyl amide and N-behenyl thio behenyl amide, Thioacetamide and an N-phenyl-thio-p-BUROMO Benz amide, A N-1-(2-thiophenyl) thio Benz amide and N-behenyl thioacetamide, A N-p-amino phenylthio Benz amide and an N-p-nitro phenylthio Benz amide, A N-p-hydroxy phenylthio Benz amide and an N-m-KURORU phenylthio Benz amide, Thio nicotinamide, a thio acetanilide, and O-ethyl-N-phenyl (thio carbamate), A thio Benz amide, a thio-m-nitro Benz amide, a thio-p-nitro Benz amide, A thio-p-amino Benz amide, N-methylthio acetamide, N-cyclohexyl Benz amide, N-chloro phenylthio Benz amide, an N-p-methoxy phenylthio Benz amide, and N-stearyl thio Benz amide.

[0016] The copper compound, thiourea derivative, or (reaching) thioamide derivative used in this invention being visible and the amount made to contain by setup of the permeability of a near-infrared region can be changed. the addition of a copper compound -- vinyl chloride system resin 100 the weight section -- receiving -- 0.05 - 5 weight section -- desirable -- 0.05-2.5 It is the weight section. moreover, the addition of a thiourea derivative -- vinyl chloride system resin 100 the weight section -- receiving -- 0.05 - 50 weight section -- it is 0.05 - 10 weight section preferably. moreover, the addition of a thioamide derivative -- vinyl chloride system resin 100 the weight section -- receiving -- 0.05 - 50 weight section -- it is 0.05 - 10 weight section preferably. Moreover, also with the same content, since permeability changes with the board thickness when the resin ingredient obtained by this invention is a plate, it needs to determine a content as the appearance from which the permeability in the board thickness finally set up is obtained.

[0017] It sets to this invention and the addition of a copper compound, a thiourea derivative, or (reaching) a thioamide derivative is vinyl chloride system resin 100. Improvement in near infrared ray absorbing power is not enough for the case of under the 0.05 weight section respectively to the weight section. On the other hand, the addition of a copper compound is vinyl chloride system resin 100. When exceeding 5 weight sections to the weight section, the improvement in near infrared ray absorbing power is not found, and the addition of a thiourea derivative or (reaching) a thioamide derivative is vinyl chloride system resin 100. In exceeding 50 weight sections to the weight section, there is a possibility that improvement in near infrared ray absorbing power may not be found, and Hayes may occur in an ingredient. In addition, reinforcing materials, such as the additive currently generally used besides the above-mentioned component if needed, for example, a thermostabilizer, processing aid, an antioxidant, light stabilizer, an ultraviolet ray absorbent, lubricant, a coloring agent, an inorganic bulking agent, and a glass fiber, etc. can also be blended.

[0018] It can manufacture easily with general-purpose mixed equipment, for example, a hot calender roll, a Banbury mixer, or an extruder, without requiring a special means and a mixed sequence foreword as the mixed approach of the vinyl chloride system resin in this invention, a thiourea derivative, a thioamide derivative, and a copper compound.

[0019] A film or a sheet is easy to be manufactured according to the usual manufacturing method. It can manufacture

by the T-die method by the extruder, the inflation-molding method, the calender fabricating method, and compression forming. Although there is especially no limit, as for the thickness of a film or a sheet, it is desirable that it is within the limits of 0.01-10mm. In addition, when increasing the reinforcement of a sheet further or attaching a pattern, the interior is made to contain the glass fiber network and the wire gauze made from stainless steel which knit and wove glass filament yarn in the shape of [of about 5mm angle] a grid, and they may be fabricated.

[0020]

[Function] carrying out heating kneading of the mixture which contained the copper compound of a general formula (I) or chlorophyll copper, sodium copper-chlorophyllin, bis-acetyl aceto night copper, and the thiourea derivative of a general formula (II) or the thioamide derivative of a general formula (III) like the above by the above-mentioned mixed approach at vinyl chloride system resin the 800-2000nm whole region -- crossing -- about -- it comes to absorb a near infrared ray to Mr. one. So that clearly from the example and the example of a comparison which are shown below, although the reason is not clear even if it carries out heating kneading of a thiourea derivative, a thioamide derivative, or the copper compound independently at vinyl chloride system resin, respectively And a near infrared ray is not absorbed about reinforcement. 800-2000nm near infrared region whole region -- crossing -- about -- Mr. one -- If it carries out from the same being said of having mixed vinyl chloride system resin, the thiourea derivative or the thioamide derivative, and the copper compound The mixture containing a thiourea derivative or a thioamide derivative, and a copper compound by carrying out heating kneading by the above-mentioned mixed approach to vinyl chloride system resin A certain reaction occurs between a thiourea derivative or a thioamide derivative, and a copper compound, and it is presumed that it is because complex (complex) is generated.

[0021]

[Example] Although an example is hung up over below and detail of this invention is given, this invention is not restricted to these examples. In addition, all the addition rates in an example show the weight section. Moreover, the transparency spectrum of the obtained resin ingredient is a spectrophotometer (Hitachi Make: 323 mold). It measured. the judgment of near infrared ray absorbing power -- the average of 900, 1000, 1100, and an absorption value with a wavelength [each] of 1500nm made O and 30% or more **, and made 30% or less x for O and 60% or more, and 80% or more of thing was performed.

[0022] The heat of near infrared ray absorbing power, humidity, and the stability over light were measured by the following approach.

Thermal resistance and moisture resistance: It is in the oven of 80 degrees C and 100%RH about a near infrared ray absorptivity sheet. It is a spectrophotometer again about the near infrared ray absorptivity after leaving it for 480 hours. (wavelength: 1000nm) It measured. The result computed by the following type estimated the shelf life of the sheet.

[0023]

[Equation 1]

$$\text{保存率} = \frac{100 - \text{加熱・加湿後の透過率}}{100 - \text{加熱・加湿前の透過率}} \times 100(\%)$$

[0024] Lightfastness: Be about a near infrared ray absorptivity sheet with UV (ultraviolet rays) circuit tester (the product made from Great Japan Plastics, super-promotion fading-test machine). It is a spectrophotometer again about the near infrared ray absorptivity after carrying out an optical exposure for 200 hours. (wavelength: 1000nm) It measured. The result computed by the following type estimated the shelf life.

[0025]

[Equation 2]

$$\text{保存率} = \frac{100 - \text{露光後の透過率}}{100 - \text{露光前の透過率}} \times 100(\%)$$

[0026] An injection molding machine is used for thermal stability. Postforming was carried out with the laying temperature of 170 degrees C for residence-time 20 minutes, color tone change of the obtained sample was measured with the color difference meter by Nippon Denshoku Co., Ltd., the color difference (**E) was searched for by the L.a.b. method, and it judged as follows.

O :superior O:fitness ** : nothing [YAKE] (yellow change size)

x: The thiourea compound 2 weight section and the copper compound 0.2 of combination which are shown in one to YAKE owner example 23 table 1, and Table 2 The weight section Vinyl chloride system resin (polymerization degree $P=1000$) 100 It adds in the weight section. They are the tin system stabilizer (dibutyltin maleate) 3 weight section and lubricant (stearin acid) 0.8 as other vinyl-chloride-resin additives to this mixture. The weight section and the processing aid 1 weight section are added. It mixed for 20 minutes by the tumbler mixer, and was made the pellet after kneading by 170 °C with 40mmphi extrusion briquetting machine. Subsequently, this pellet was dried and the green transparency resin plate which does not have Hayes with a thickness of 3mm using an injection molding machine was produced. These obtained plates The transparency spectrum in 800-2000nm was measured. Although the result was shown in Table 5, it excelled in the absorbing power of a near-infrared region.

[0027] It is vinyl chloride resin 100 about a thiourea compound and a copper compound at the combination shown in 24 to example 33 table 2, and Table 3, and the weight section. It adds in the weight section and they are the tin system stabilizer (dibutyltin maleate) 3 weight section and lubricant (stearin acid) 0.8 as other vinyl-chloride-resin additives to this mixture. The weight section and the processing aid 1 weight section are added, and it mixes for 20 minutes by the tumbler mixer, and is 40mmphi extrusion briquetting machine. It was made the pellet after kneading at 170 degrees C. Subsequently, this pellet was dried and the green transparency resin plate which does not have Hayes with a thickness of 3mm using an injection molding machine was produced. The transparency spectrum in 800-2000nm was measured about these obtained plates. Although the result was shown in Table 5, it excelled in the absorbing power of a near-infrared region.

[0028]

[Table 1]

実施例	配 合 処 方				(重 量 部)	
	チ オ 尿 素 化 合 物	銅 化 合 物	塩化ビニル系樹脂			
No.						
1	1,3-ジフェニルチオ尿素	2	p-クロル安息香酸銅	0.2	PVC 100	
2	1,3-ジラウリルチオ尿素	2	p-クロル安息香酸銅	0.2	PVC 100	
3	1,3-ジエチルチオ尿素	2	p-クロル安息香酸銅	0.2	PVC 100	
4	1,3-ジメチルチオ尿素	2	p-クロル安息香酸銅	0.2	PVC 100	
5	1,3-ジ-m-クロルフェニルチオ尿素	2	p-クロル安息香酸銅	0.2	PVC 100	
6	1,3-ジフェニルチオ尿素	2	ステアリン酸銅	0.2	PVC 100	
7	1,3-ジフェニルチオ尿素	2	ベヘン酸銅	0.2	PVC 100	
8	1,3-ジフェニルチオ尿素	2	p-ニトロ安息香酸銅	0.2	PVC 100	
9	1,3-ジフェニルチオ尿素+1,3-ジクロルフェニルチオ尿素(1:1)	2	m-クロル安息香酸銅	0.2	PVC 100	
10	1,3-ジフェニルチオ尿素	2	p-ブロム安息香酸銅	0.2	PVC 100	
11	1,3-ジフェニルチオ尿素	2	安息香酸銅	0.2	PVC 100	
12	1,3-ジフェニルチオ尿素	2	o-ベンゾイル安息香酸銅	0.2	PVC 100	
13	1,3-ジフェニルチオ尿素	2	銅クロロフィル	0.2	PVC 100	
14	1,3-ジフェニルチオ尿素	2	グルコン酸銅	0.2	PVC 100	
15	1,3-ジフェニルチオ尿素	2	4-シクロヘキシル酸銅	0.2	PVC 100	

[0029]

[Table 2]

実施例 No.	配 合 処 方 (重 量 部)			塩化ビニル系樹脂		
	チオ尿素化合物／チオアミド化合物	銅 化 合 物				
16	1,3-ジフェニルチオ尿素	2	ロ-ドデシルベンゼンスルホン酸銅	0.2	PVC	100
17	1,3-ジフェニルチオ尿素	2	ナフタリンスルホン酸銅	0.2	PVC	100
18	1,3-ジフェニルチオ尿素	2	α -ナフチルリン酸銅	0.2	PVC	100
19	1,3-ジフェニルチオ尿素	2	ステアリリン酸銅+m-クロル安息香酸銅(1:1)	0.2	PVC	100
20	1,3-ジフェニルチオ尿素	2	ステアリルリン酸銅	0.2	PVC	100
21	1,3-ジフェニルチオ尿素	2	酢 酸 銅	0.2	PVC	100
22	1,3-ジフェニルチオ尿素	2	コハク酸銅	0.2	PVC	100
23	1,3-ジフェニルチオ尿素	2	グルタル酸銅	0.2	PVC	100
24	1,3-ジフェニルチオ尿素	2	p-クロル安息香酸銅	0.4	PVC	100
25	1,3-ジフェニルチオ尿素	4	p-クロル安息香酸銅	0.2	PVC	100
26	1,3-ジフェニルチオ尿素	1	p-クロル安息香酸銅	0.2	PVC	100
27	1,3-ジフェニルチオ尿素	2	p-クロル安息香酸銅	0.1	PVC	100
28	1,3-ジ-m-クロルフェニルチオ尿素	2	p-クロル安息香酸銅	0.4	PVC	100
29	1,3-ジ-m-クロルフェニルチオ尿素	4	p-クロル安息香酸銅	0.2	PVC	100
30	1,3-ジ-m-クロルフェニルチオ尿素	1	p-クロル安息香酸銅	0.2	PVC	100

[0030] They are the thioamide compound 2 weight section and a copper compound 0.2 in the combination shown in 34 to example 37 table 3. It is vinyl chloride resin 100 about the weight section. It added in the weight section, the tin system stabilizer (dibutyltin maleate) 3 weight section, the lubricant (stearin acid) 0.8 weight section, and the processing aid 1 weight section were added as other vinyl-chloride-resin additives into this mixture, and it mixed for 20 minutes by the tumbler mixer, and was made the pellet after kneading by 170 ** with 40mmphi extrusion briquetting machine.

Subsequently, this pellet was dried and the green transparence resin plate which does not have Hayes with a thickness of 3mm using an injection molding machine was produced. These obtained plates The transparency spectrum in 800-2000nm was measured. Although the result was shown in Table 5, it excelled in the absorbing power of a near-infrared region.

[0031]

[Table 3]

実施例 No.	配 合 方 法 (重 量 部)				塩化ビニル系樹脂
	チオ尿素化合物/チオアミド化合物	銅 化 合 物	銅 化 合 物	銅 化 合 物	
31	1,3 -ジ- <i>m</i> -クロルフェニルチオ尿素	2	p-クロル安息香酸銅	0.1	PVC 100
32	1,3 -ジラウリルチオ尿素	2	p-クロル安息香酸銅	0.4	PVC 100
33	1,3 -ジラウリルチオ尿素	2	p-クロル安息香酸銅	0.1	PVC 100
34	N-フェニルチオベンツアミド	2	p-クロル安息香酸銅	0.2	PVC 100
35	N-シクロヘキシルチオベンツアミド	2	p-クロル安息香酸銅	0.2	PVC 100
36	N-ステアリルチオベンツアミド	2	p-クロル安息香酸銅	0.2	PVC 100
37	チオアセトアニリド	2	p-クロル安息香酸銅	0.2	PVC 100

[0032] Combination of the combination of example 38 example 1 was mixed for 20 minutes by the tumbler mixer, and it sheet-ized to 1mm thickness by the T-die fabricating method by 170 °C 40mmphi extruding press machine. The temperature of a cooling roller was 85 degrees C. The thermal insulation effectiveness of the obtained near infrared ray absorptivity sheet was measured using the equipment shown in drawing 1 . 1 is 60W in drawing 1 . As for an incandescent lamp and 2, a test portion and 3 are precision thermometers. The result was as drawing 2 . Although A in drawing shows the thermal insulation effectiveness of a near infrared ray absorptivity sheet, when the comparison with B which showed the thermal insulation effectiveness of the usual polystyrene resin which does not contain the near infrared ray absorbent shown in this drawing is carried out, in the B, along with the passage of time, a temperature gradient becomes large from A, and it turns out that the A excels B in the thermal insulation ability of a near-infrared region.

[0033] it be vinyl chloride resin 100 at independent respectively about the thiourea compound, thioamide compound, or copper compound show in one to example of comparison 9 table 4. it add in the weight section and be a tin system stabilizer as other vinyl chloride resin additives to this mixture. (dibutyltin maleate) 3 weight sections and lubricant 0.8 (stearin acid) the weight section and the processing aid 1 weight section be add, and it mix for 20 minutes by the tumbler mixer, and be 40mmphi extrusion briquetting machine. it be made the pellet after kneading at 170 degrees C. Subsequently, this pellet was dried and the green transparence resin plate which does not have Hayes with a thickness of 3mm using an injection molding machine was produced. These obtained plates The transparency spectrum in 800-2000nm was measured. Although the result was shown in Table 6, there was only 30% or less of near infrared ray absorbing power altogether.

[0034]

[Table 4]

比較例 No.	配 合 処 方 (重 量 部)			塩化ビニル系樹脂
	チオ尿素化合物／チオアミド化合物	銅 化 合 物		
1	—	—	—	PVC 100
2	1,3 - ジフェニルチオ尿素	—	—	PVC 100
3	1,3 - ジラウリルチオ尿素ルチオ尿素	—	—	PVC 100
4	1,3 - ジ - m - クロルフェニルチオ尿素	—	—	PVC 100
5	N - フェニルチオベンツアミド	—	—	PVC 100
6	N - シクロヘキシルチオベンツアミド	—	—	PVC 100
7	—	p - クロル安息香酸銅	0.2	PVC 100
8	—	ペヘン酸銅	0.2	PVC 100
9	—	ステアリン酸銅	0.2	PVC 100

[0035]
[Table 5]

	単 位	実 施 例																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
近赤外線吸収性	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
耐熱性、耐湿性	%	95	93	92	92	95	94	93	93	95	92	94	94	94	92	92	95	93	94
耐 光 性	%	94	93	92	89	94	93	93	93	94	87	94	91	89	87	89	92	92	90
熱 安 定 性	150℃×20分 ΔE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

[0036]
[Table 6]

	单 位	实 施 例												比 較 例										
		24	25	26	27	28	29	30	31	32	33	34	35	36	37	1	2	3	4	5	6	7	8	9
近赤外線吸収性	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×	×	×	×	×	×	×
耐熱性、耐湿性	%	94	93	94	93	91	92	95	92	92	91	91	95	92	94	—	—	—	—	—	—	—	—	—
耐 光 性	%	94	92	94	92	90	89	92	94	92	90	89	94	87	94	—	—	—	—	—	—	—	—	—
熱 安 定 性	150℃×20分 ΔE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

[0037] According to Table 5 and Table 6, it is clear the sheet's of the vinyl chloride system resin which kneaded the thiourea compound or the thioamide compound, and the copper compound to become a strong near infrared ray absorptivity sheet. Moreover, this near infrared ray absorptivity hardly falls by heating, humidification, or exposure, but it turns out to change of the environmental condition of handling or preservation that it is extremely stable. In addition, the sheet of the vinyl chloride system resin which kneaded independently the thiourea compound, the thioamide compound, or the copper compound did not show near infrared ray absorptivity substantially.

[0038]

[Effect of the Invention] Since heating kneading of the near infrared ray absorption vinyl chloride system resin constituent of this invention is carried out, instability, such as tenebrescence, does not have the resin ingredient which it comes to fabricate a sheet or in the shape of a film, and the photochromism of carrying out tenebrescence to a dark place by prolonged neglect is not seen, either but the outstanding near infrared ray absorbing power is shown, it is industrially useful as optical filter and heat ray absorptivity grading material etc. Moreover, obtained near infrared ray absorption sheet It has the strong absorptivity across which it goes throughout a 800-2000nm near infrared region. It can use by using these properties as optical materials, such as a near infrared ray cut-off filter, a record ingredient, a heat ray shielding material, an accumulation ingredient, a near infrared ray detection sensor, etc. Although the constituent of this invention contains the metal, since there is little coloring, the Plastic solid of the sheet containing these, a film, etc. becomes the thing excellent in the appearance.

[Translation done.]